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## Fear-Mongering or Fact-Driven? Illuminating the Interplay of Objective Risk and Emotion-Evoking Form in the Response to Epidemic News

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### ABSTRACT

This study examined the veracity of the common assumption that news coverage of epidemic outbreaks spawns heightened fears and risk perceptions. An online experiment with 1,324 participants investigated the interplay of the form of news coverage (factual/emotion-laden) and key aspects of actual risk (low/high vulnerability, low/high severity) on audience responses. Participants read one of eight versions of a newspaper article followed by measures on *risk perceptions*, *negative affect*, *behavioral intentions*, and *perceived sensationalism*. Risk perceptions and fear were primarily driven by objective risk characteristics, whereas emotion-laden news form only increased perceptions of disease severity, not of fear or personal vulnerability.

Infectious disease outbreaks have plagued mankind throughout history. News media play a key role in informing the public, yet common criticisms suggest that they may aggravate the impact of outbreaks by intensifying fears and increasing risk perceptions. The criticisms center around the assumption of an overly emotion-laden nature of news reporting, as in sensationalist news (Dunwoody & Peters, 1992; Shuchman & Wilkes, 1997; Yusuf, Yahaya, & Qabli, 2015). The conclusions of a survey of public concern about a potential Ebola outbreak in the U.S. during the 2014 epidemic exemplifies such criticism: “The tone of the coverage seems to be increasing fear while not improving understanding” (Eagleton Institute of Politics, 2014, p. 3).

Existing empirical evidence from journalism and media effects research provides indirect support for the common belief that an emotional tone of coverage increases fear and perceived risk (e.g., Grabe, Lang, & Zhao, 2003; Zillmann, 2006), yet direct evidence—particularly for the case of epidemics—is missing. Importantly, a central question that has remained unanswered is what exactly drives heightened risk perceptions and fear: An emotion-laden style of reporting, or real-world characteristics, that is objective risks, themselves? Entailing a prospect that is naturally frightening, epidemic outbreaks are inherently emotion-laden. Thus, it is important to understand, how much emotion can be attributed to the nature of the risk itself (e.g., its severity, rapid spread) and how much to the nature of the portrayal of the health risk in news coverage (e.g., emotion-laden). Yet, the interplay between objective risk and emotion-laden style is largely unknown.

The present research aims to address these questions through systematically investigating independent and combined effects of risk characteristics (low/high vulnerability to risk, low/high severity), and the style or form of a news article (factual/emotional), when covering the same risk story. The present study moves beyond existing literature in three important ways. First, prior research investigated the impact of either only severity information, only the emotionality of a risk portrayal, or of a joint manipulation of severity and vulnerability (Gibson & Zillmann, 1994; Zillmann, Gibson, & Sargent, 1999). The present experiment is the first to examine the independent and combined effects of these central factors systematically. Second, only few studies investigated the impact of content and formal features on risk perceptions separately, comparing either different types of risks (e.g., food poisoning vs. handgun violence; Aust & Zillmann, 1996), or risk to non-risk stories (e.g., tornado vs. layoffs at a corporation; Grabe et al., 2003). In contrast, this study investigates the interplay of content and form of a story covering the *same type of risk*, systematically varied in key characteristics. Third, this study aims at reconciling the seemingly conflicting finding that emotion-evoking news increases risk perceptions and fear, but may likewise instigate distrust in recipients, which, in turn, may reduce effects on perceived risk and fear (e.g., Grabe, Zhou, Lang, & Bolls, 2000). Taken together, this study thus illuminates the interplay of objective risk with the emotionality of its news portrayal, allowing for a clearer understanding of how an emotion-laden reporting style may influence public response to an epidemic outbreak in different risk scenarios.

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## Objective risk characteristics and emotion-laden news portrayal: Impact on audiences' response to risk

Communicating risk is challenging, as lay perceptions of risk are barely driven by technical, objectifiable risk characteristics but are shaped by a complex interplay of technical characteristics with other factors, such as voluntariness, controllability, familiarity, and catastrophic potential (Slovic, 1987). Predicting responses to risk information can thus be a difficult undertaking. Socio-cognitive models from the field of health communication commonly discriminate two distinct threat components that influence individual's response to risk, *perceived severity* (i.e., seriousness or magnitude of a risk) and *perceived vulnerability* (i.e., likelihood of being affected by a risk). These have been recurrently found to affect risk perceptions, health intentions, and behavioral responses differently (Das, De Wit, & Stroebe, 2003; Keer, Van Den Putte, & Neijens, 2010; Witte & Allen, 2000). Although some models, such as the stage model, have proposed that severity and vulnerability should interact in their effects on outcomes measures, this interaction has rarely received empirical support (De Hoog, Stroebe, & De Wit, 2007). Rather, studies suggest that "severity must reach a certain magnitude to figure in health decisions, but once this magnitude has been reached decisions are based solely on perceived susceptibility" (Abraham & Sheeran, 2005, p. 39). To illustrate, in the case of a potentially fatal disease, we would expect changes in risk severity (e.g., mortality rate) to have little impact on perceptions of threat, if the disease occurs rarely and individuals consider their personal vulnerability low. Increases in the psychological proximity of the risk (e.g., illness of a colleague), we expect would have a much stronger impact on risk perceptions. This importance of vulnerability (or susceptibility) for individuals' response to risk is supported by several meta-analyses (Brewer et al., 2007; De Hoog et al., 2007). Likewise experimental studies found that the impact of vulnerability information on behavioral intentions and actual behavior outweighed severity information (e.g., Das et al., 2003).

Health communication research furthermore indicates that objective risk characteristics inevitably evoke emotion (Zikmund-Fisher, Fagerlin, & Ubel, 2010). This suggests that emotional responses to news coverage on health risks may not solely be attributed to an emotional portrayal of risk by journalists, as the risk itself—and in that sense factual reporting on it—may likewise elicit emotional responses. Since, an emotional impact of factual reporting would be mostly outside the control of individual journalists (they could only decide not to report, or omit facts) and only the specific portrayal of risk (e.g., applying emotional vs. factual reporting style) is within the bounds of their control, it is crucial to investigate what drives audience response more strongly: Objective risk characteristics or emotion-laden form.

Based on the reviewed research, we may form various expectations regarding the impact of *factual* reporting of epidemic risk: Firstly, *perceptions of risk* should differ dependent on the information on objective risk characteristics (severity, vulnerability) contained in a news story. Secondly, objective risk characteristics may increase *negative affect*, independent of news form (e.g., De Hoog et al., 2007). Thirdly, following

meta-analyses (De Hoog et al., 2007; Witte & Allen, 2000), we expect both types of risk characteristics to increase *behavioral intentions*, yet expect vulnerability to exert a stronger impact than severity. Accordingly, hypothesize:

- H1: News on risks with high severity increases *perceptions of risk severity* (H1a), *negative affect* (H1b), and *behavioral intentions* (H1c) compared to news on risks with low severity.
- H2: News on risks with high vulnerability increases *perceptions of risk vulnerability* (H2a), *negative affect* (H2b), and *behavioral intentions* (H2c) compared to news on risks with low vulnerability.
- H3: News on risks with high vulnerability increases *behavioral intentions* more than news on risks with high severity.

Past studies on media effects have rarely examined the effects of emotion-evoking reporting across the two aspects of risk. Within the field of journalism research and media effects studies two types of research have provided evidence for the effects of emotion-evoking formal features on risk perception and affect. Firstly, research on *news sensationalism* found that sensationalist news features (features evoking sensory and emotional arousal), when included in stories covering threats, can induce heightened risk perceptions among audiences. This was found for *emotion-arousing content* (e.g., stories on tsunami, violence) and emotion-evoking *tabloid-style news packaging* (e.g., music, close-ups) (Grabe et al., 2003).

Secondly, research on *exemplification*, which examines the impact of the use of exemplars (i.e., individual cases, examples, anecdotal evidence) in news stories, showed that especially concrete, iconic, and emotionally arousing exemplars strongly influenced audiences' perceptions (Zillmann, 2006). Although primarily interested in the effects of exemplification, these studies provide empirical evidence on the impact of emotion-evoking elements in news on (health) threats. News with *emotive personal stories*, such as the emotional account of a victim (Aust & Zillmann, 1996), or *emotional imagery* such as explicit photographs (Zillmann & Gan, 1996; Zillmann et al., 1999) induced greater perceptions of the severity of a risk, of personal vulnerability and stronger negative affect than news without emotive elements.

These findings resonate with insights gained in the fields of risk research and health communication that typically study risk judgment and decision-making in a non-news context. Consistent with the findings of Zillmann and colleagues, risk research showed that also in non-news contexts *emotion-evoking imagery*, both photographs and audio-visuals, and *emotion-eliciting language*, such as graphic descriptions, increased risk perceptions (e.g., Hong, Lee, & Yu, 2010; Sunstein, 2002; Xie, Wang, Zhang, & Yu, 2011).

Emotion-evoking news coverage can further be expected to influence individual's behavioral responses to a health crisis. Risk research and health communication provided evidence that the emotions evoked by a risk message can influence behavioral intentions to reduce a health risk (Botta, Dunker,

Fenson-Hood, Maltarich, & McDonald, 2008; Smith et al., 2008). Thus, the emotion-laden form of a news report potentially influences behavioral intentions, perhaps even regardless of risk characteristics. Accordingly, we hypothesize:

H4: Emotion-laden form increases *perceptions of risk severity* (H4a), *risk vulnerability* (H4b), *negative affect* (H4c), and *behavioral intentions* (H4d) compared to factual form.

Nabi and Prestin (2016) found that the effect of emotional health news hinges on the consistency between emotional news presentation and risk-related messages in news (e.g., whether a low efficacy message is covered in a fear frame, or a high efficacy message in a hope frame). Although Nabi and Prestin study efficacy rather than risk, we would expect similar interaction effects between the emotion-laden form and the objective risk covered in a news story. However, as prior research has rarely investigated the effects of an emotional form across the different risk types, we cannot form clear hypotheses. Thus, we pose the following research question:

RQ1: What are the combined, that is, interacting, effects of objective risk characteristics and emotion-evoking form on participants' response—their risk perceptions, negative affect, and behavioral intentions?

### Objective risk characteristics and emotion-laden news portrayal: Impact on perceptions of news sensationalism

Though empirical evidence from the health domain shows that emotional news may aggravate risk perceptions, negative affect, and health behavioral intentions, journalism researchers have proposed that audiences react with increased skepticism and disbelief to emotion-evoking elements, such as in sensational news. Grabe and colleagues (2000) suggest that audiences associate sensational, emotion-arousing news packaging techniques with tabloid or lower quality news, and use formal features as a guide to differentiate between the two. The study found that the audiences rated stories with tabloid TV production features, such as music, sound effects, or an obtrusive reporter voice, as less believable, less informative, less objective and less enjoyable than stories without these features.

A follow-up study (Grabe et al., 2003) investigating the influence of tabloid formal features in combination with either calm (e.g., layoffs at a corporation) or arousing (e.g., drive-by shooting) stories found that participants rated calm and arousing stories as equally informative, yet rated both as marginally less objective and less believable if presented in emotion-evoking form. Further, tabloid production features decreased perceptions of objectivity especially for calm stories. Contrasting the aforementioned studies that examined TV news, Burgers and De Graaf (2013) found that emotional language in print media increased perceptions of newsworthiness and audiences' evaluation of article quality, while emotionality had no impact on believability.

One potential explanation for the inconsistencies in previous studies is that these studies did not take into account differences in actual risk (vulnerability, severity) combined with emotion-laden form. By studying the combined effects of all three factors, the present study may help to remedy these inconsistencies. We thus explicitly connect journalism and health communication research. Especially noteworthy is that the downplaying of the quality of a message observed in the aforementioned sensationalism studies bears strong resemblance to reactance responses in persuasion studies (Rains, 2013) and to the defensive responses often observed following self-threatening health information (Das et al., 2003; De Hoog et al., 2007; Van 't Riet & Ruiter, 2013). We thus in particular relate both fields by exploring two competing explanations for individuals' responses to emotion-laden news. Firstly, based on the premise that *sensationalism* implies an exaggerated—or disproportionately emotional—portrayal of risk, we may assume that only if low risk is portrayed in an emotion-laden form, audiences perceive the portrayal as sensational and as lower quality, whereas they might consider an emotion-laden portrayal of high risk justified. Thus, we would expect to find effects of emotion-laden form especially under conditions of low risk. However, in contrast to the sensationalism explanation, insights on defense mechanisms from health communication research suggests that if an article evokes vulnerability to a severe risk, audiences react with defensive processing, dismissing the article as low-quality and dramatized. Accordingly, while an emotion-laden portrayal may not necessarily *automatically* lead audiences to dismiss its content, it may be that audiences readily draw on the emotion-laden form as a reason to reject its truthfulness *if they feel personally vulnerable* (i.e., if they feel at risk, they rationalize thinking “this is overly emotional”). In this case, we would expect to find effects of emotion-laden form especially under conditions of high risk. To test for both competing explanations, we investigate the following research questions:

RQ2: What are the independent and combined effects of objective risk characteristics and emotion-evoking form on perceptions of the article as sensationalist or dramatized?

RQ3: Does perceived sensationalism counteract—that is, mediate—the effects of news on participants' response?

### Method

A total of 1,709 participants completed an online survey experiment, in which they were randomly assigned to one of the eight conditions of a 2 (severity: low, high) x 2 (vulnerability: low, high) x 2 (form: factual, emotional) between-subjects design.

### Participants and procedure

The study was conducted in the Netherlands and data were collected via the Dutch I&O Research Panel, a nation-wide and representative panel<sup>1</sup>. Participants read one of eight versions of a newspaper article on an epidemic Enterovirus

<sup>1</sup>The panel is representative (ISO 26362 certified), consisting of approximately 20,000 active members that were recruited offline based on random samplings of individuals and households.



outbreak, and afterwards filled in a questionnaire. Article versions were designed for the purpose of the experiment. Based on ethical considerations, participants were informed that the article was fictitious, but we included an introductory statement encouraging and helping them to envisage it was real. The questionnaire concluded with a debriefing. Of the 1,709 panel members that participated, 165 were excluded based on a control question (stimulus not displayed correctly,  $n = 105$ ), timers controlling for stimulus reading time (excluded if 0 s,  $n = 59$ ), and questionnaire completion time (excluded if 0 min,  $n = 1$ ). Further, certain inclusion criteria were specified prior to analysis. We excluded participants with reading time of the stimulus of  $< 20$  s or  $> 80$  min ( $n = 175$ ) as under conditions of very superficial reading, manipulations, especially of emotional form, cannot work sufficiently. The same applies to large time gaps between reading the stimulus and filling in the questionnaire, thus we excluded participants with completion time  $< 3$  min or  $> 6$  hrs ( $n = 27$ ). Applying the inclusion criteria, the final sample consisted of 1,324 participants ( $M_{\text{age}} = 56$  years,  $SD = 14.50$ ; 53.2% female). Participants were predominantly of Dutch descent (99.1%), and more than half were highly educated (38.4% professional training, 21% university). Additional statistical tests (Chi-square) showed no significant differences in the distribution of demographics across experimental conditions, and  $n$  per condition was fairly equal (range: 159–183)<sup>2</sup>.

### Stimulus materials

All stimuli tackled the spread of a fictitious variant of the Enterovirus. Geographically bound outbreaks of enteroviruses occur episodically and sometimes viruses mutate to more serious versions, which we believe made the topic relevant and credible. Enteroviruses usually cause only mild, flu-like symptoms, however, new types that have emerged in the last years have caused unusually severe respiratory disease. Following a common structure that journalists use when describing outbreaks of new diseases, all news articles included background information describing the enterovirus and the new strain, its symptoms, and a statement by experts classifying the risk. All articles included the headline, a lead, a photograph and five paragraphs (length: 345–416 words).

### Severity manipulation

For the severity manipulation, the symptoms and fatality of the virus infection were altered in three ways. First, in the low severity condition, the article stated that the virus can cause “severe respiratory illness requiring hospitalization”. In the high severity condition we added to this statement: “encephalitis (infection of the brain), and in some cases neurologic complications that have caused fatalities”. Second, while the low severity condition stated that the virus has caused 21 hospitalizations (out of 680 cases), the high severity condition specified 21 fatalities. Third, the World Health Organization’s (WHO) assessment of the virus was adapted, for example,

from “unusually dangerous” (high severity) to “worth watching, but not of high concern” (low severity).

### Vulnerability manipulation

Vulnerability was manipulated through disease proximity by altering the country in which the infection occurs. In the high vulnerability version the virus spreads to the country the study was conducted (the Netherlands), in the low vulnerability version to a distant place (Korea). Secondly, for high vulnerability we added a statement that emphasized the ease of disease transmission (underlined): “The EV-74 strain transmits easily, like common cold and flu viruses, through saliva and can be caught by contact with an infected person (...).”

### Factual/emotion-evoking formal features

We created a factual and an emotion-evoking version of the news report by adding several formal features that we derived from theoretical frameworks from news sensationalism, in which emotionality is a key dimension (Grabe et al., 2003, 2000; Hendriks Vettehen, Nuijten, & Beentjes, 2005).

As prior research found that photographs impact emotional response (Lang, Greenwald, Bradley, & Hamm, 1993) we firstly altered the photographs included in the article. Following Schaap and Pleijter (2012), who define photos of politicians as abstract, non-sensational and, in contrast, photos of laypersons as concrete and emotional, the factual version included a photograph of Dr. Keiji Fukuda, WHO Assistant Director-General for Health Security and Environment, whereas the high emotional version portrayed a layperson. More specifically, as photos can be classified as arousing (or emotional) if portraying so-called survival topics (Hendriks Vettehen et al., 2005), the emotional version featured a photograph of a patient being transported to hospital (see Figure 1).

Secondly, we manipulated language by adding semantic intensifiers (words that can be replaced with a less extreme version, such as *disastrous* in place of *serious*), and lexical intensifiers (words that can be removed from the text resulting in a decrease in intensity, such as *very* in the expression *very serious*), and altering the specificity of language, that is, its concreteness and vividness (Burgers & De Graaf, 2013). To give examples, the article stated “Chinese officials reported 680 cases and 21 deaths caused by the recent outbreak of this brutally [lexical intensifier] virulent strain” (emotional form) versus “Chinese officials reported 680 cases and 21 deaths caused by the recent outbreak of this virulent strain” (factual form). Using semantic intensifiers (underlined) it also stated: “victims of the new EV-74 strain, however suffer severe respiratory illness requiring hospitalization” (emotional form) versus “those contracting the new EV-74 strain, however, may also experience severe respiratory illness requiring hospitalization” (factual form).

Further, Wallis and Nerlich (2005) argue that journalists often include emotionality through militaristic language (e.g., a virus described as an agent that actively infects and kills).

<sup>2</sup>More detailed information on sample sizes and characteristics per condition are available from the corresponding author.



Figure 1. Photographs included in the factual version (left), and emotional version (right). Copyright by Reuters (left) and Imago (right).

Accordingly, we added militaristic language for emotional form. For example, the factual version stated that the patient “fell ill”, whereas the emotion-laden version used the term “struck down by the virus”. Later the article stated that the patient’s “condition has improved” (factual form) versus he has “successfully battled the disease” (emotional form).

Lastly, following exemplification and news sensationalism research we manipulated emotional form by including a vivid, concrete, and emotion-evoking personal story (Aust & Zillmann, 1996; Hendriks Vettehen et al., 2005). Whereas the factual article briefly identified the victim as a 36-year businessman from the Netherlands/Korea, who fell severely ill after a business trip, the emotional condition includes an eyewitness account of his wife (in direct quotation), who agitatedly gives a vivid account of what happened and what symptoms her husband suffered.

## Dependent measures

### Manipulation check

To test whether the manipulation of emotion-laden form was successful, participants were asked to rate on 4-point Likert scales to what extent the picture as well as the article (text) was intense, emotional, frightening, vivid, factual, sober, unemotional ( $\alpha = .72$ ). Manipulations of severity and vulnerability were tested with measures of perceived severity and perceived vulnerability reported below.

### Perceived severity and perceived vulnerability

We measured risk perceptions, both of severity and vulnerability, with a 12-item, 7-point semantic differential scale extending commonly used scales from health communication (e.g., Das, De Wit, Vet, & Frijns, 2008) by assessing both cognitive and affective risk perceptions (e.g., Loewenstein, Hsee, Weber, & Welch, 2001). To measure *perceived severity*, participants were asked to evaluate the severity of the Enterovirus as mild–severe, harmless–harmful, non-critical–life-threatening (cognitive evaluation). Further, they indicated how they feel, when they think about how serious it would be, if they got infected with the Enterovirus: scared–not scared, calm–anxious, worried–not worried (affective evaluation). To measure *perceived vulnerability*, participants were asked to estimate the likelihood of getting infected as unlikely–likely, impossible–possible, unrealistic–realistic (cognitive evaluation). Further, they indicated how they felt when they think about the

chance of getting infected: Scared–not scared, calm–anxious, worried–not worried. Cognitive and affective responses for severity and vulnerability were combined into single indices respectively, as the scales for risk severity ( $M = 4.56$ ,  $SD = 1.27$ ;  $\alpha = .89$ ) and vulnerability ( $M = 3.43$ ,  $SD = 1.21$ ;  $\alpha = .84$ ) proved reliable, and a factor analysis confirmed that all items aligned on these two risk factors.

### Negative affect

We used a broader measure of *negative affect*, rather than only measuring fear, to capture also other related emotional responses. Participants were asked to rate to what extent the article made them feel scared–not scared, calm–anxious, worried–not worried (selected items from Berger, 2007; 7-point semantic-differential scales,  $\alpha = .78$ ;  $M = 3.34$ ,  $SD = 1.36$ ).

### Behavioral intentions

We measured intentions for two potential behaviors. Participants were asked to indicate how much they (a) “intended to search for more information about the Enterovirus”, and (b) “intended to take actions to reduce their chance of an Enterovirus infection” (7-point Likert scale;  $r = .67$ ;  $M = 2.93$ ,  $SD = 1.66$ ).

### Perceived sensationalism

To measure how sensationalist audiences perceived the articles they read, respondents were asked to indicate, whether they thought the article “exaggerated the risk of Enterovirus”, and “was sensationalist” (5-point Likert scale;  $r = .65$ ;  $M = 2.71$ ,  $SD = 0.83$ ).

## Results

### Manipulation checks

All manipulations were successful. Participants rated the article in emotional form as significantly more emotional,  $M = 2.27$ ,  $SD = .36$ , than that in factual form,  $M = 2.06$ ,  $SD = .39$ ;  $t(1322) = 9.87$ ,  $p < .001$ ,  $\eta^2 = .07$ . Yet, the article in emotion-laden form was still perceived as moderately emotional only. The high severity manipulation led to significantly higher severity ratings,  $M = 4.99$ ,  $SD = 1.14$ , than the low severity manipulation,  $M = 4.11$ ,  $SD = 1.25$ ;  $t(1322) = 13.41$ ,  $p < .001$ ,  $\eta^2 = .12$ . Equally, the high vulnerability manipulation evoked significantly higher vulnerability ratings,  $M = 3.60$ ,

$SD = 1.19$ , than the low vulnerability manipulation,  $M = 3.27$ ,  $SD = 1.21$ ;  $t(1322) = 5.10$ ,  $p < .001$ ,  $\eta^2 = .02$ .

### Risk-related audience response

A  $2 \times 2 \times 2$  MANOVA<sup>3</sup> was conducted to determine the impact of low vs. high severity, low vs. high vulnerability, and emotional vs. factual form on risk-related audience response (*perceived severity*, *perceived vulnerability*, *negative affect*, *behavioral intentions*), as well as possible interaction effects, particularly between form and the two risk characteristics. Significant omnibus results were followed up by univariate tests.

Table 1 shows the obtained multivariate results. The omnibus test yielded significant main effects of all experimental factors on at least one of the four dependent variables. Further, the analysis revealed a significant two-way interaction of vulnerability and severity. All remaining two-way or three-way interactions were non-significant.

The results of follow-up ANOVAs are reported in Table 2. A first ANOVA examining the univariate effects of severity yielded significant effects on all dependent variables. Participants reading the news article with high severity information, perceived the severity of and their vulnerability to the health risk as significantly higher, experienced stronger negative affect, and reported greater intentions for performing

risk-reducing behaviors than those reading the news article with low severity information. These results confirm hypotheses H1a through H1c.

A second ANOVA examining the univariate effects of vulnerability revealed significant effects on almost all outcomes variables. In line with hypotheses H2a through H2c, participants reading the news article stating that vulnerability is high, perceived greater vulnerability, experienced stronger negative affect, and reported higher behavioral intentions than those reading the news article stating that vulnerability is low. Univariate tests showed an interaction between the two risk characteristics on negative affect and behavioral intentions. Simple effects analyses indicated that participants reading the article with high as compared to low vulnerability reported more negative affect, yet only if the suggested severity was also high;  $F(1, 1316) = 18.49$ ,  $p < .001$ ,  $\eta = .01$ . In other words, if the portrayed disease was serious, the extent to which participants experienced negative feelings (e.g., fear) depended on how vulnerable the article stated they were. A similar pattern was observed for behavioral intentions. Participants reading the article that stated they were highly vulnerable compared to less vulnerable reported stronger behavioral intentions regardless of whether suggested severity was low,  $F(1, 1316) = 4.11$ ,  $p = .04$ ,  $\eta = .01$ , or high,  $F(1, 1316) = 26.00$ ,  $p < .001$ ,  $\eta = .02$ . Like with negative affect, the difference was greater under conditions of high severity. Comparing effect sizes, the results further support H3 because high vulnerability resulted in slightly stronger health intentions than high severity information ( $\eta_{highVul} = .02 > \eta_{highSev} = .01$ ), however, the difference was small.

A third ANOVA examining the univariate effects of form revealed significant effects on perceived severity. In line with H4a participants who read the article in emotion-laden form perceived the risk as significantly more severe than those reading the factual article. However, contrary to expectations (H4b, H4c, and H4d), emotion-laden form did not significantly influence perceived vulnerability, negative affect or health intentions. These findings also provide an answer to RQ1 regarding the combined effects of objective risk

**Table 1.** Multivariate results of the 2 (low vs. high severity)  $\times$  2 (low vs. high vulnerability)  $\times$  2 (factual vs. emotional form) MANOVA.

Main and interaction effects	<i>F</i>	<i>df</i>	<i>p</i>	$\eta_p^2$
Independent variables main effect	52.10	(4, 1313)	***	.14
Severity manipulation	20.17	(4, 1313)	***	.06
Vulnerability manipulation	6.18	(4, 1313)	***	.02
Form manipulation				
Independent variables interaction effects	.83	(4, 1313)	.51	<i>ns</i>
Severity $\times$ form	.26	(4, 1313)	.90	<i>ns</i>
Vulnerability $\times$ form	2.50	(4, 1313)	*	.01
Severity $\times$ vulnerability	1.52	(4, 1313)	.19	<i>ns</i>
Severity $\times$ vulnerability $\times$ form				

Notes. Multivariate statistic used was Pillai's trace.

\* $p < .05$ . \*\*\* $p < .001$ . *ns* denotes that effect sizes were not calculated for statistically insignificant results.

**Table 2.** Univariate results of the 2(severity)  $\times$  2(vulnerability)  $\times$  2(form) MANOVA for all four dependent variables.

DV	Severity manipulation				Vulnerability manipulation				Form manipulation			
	<i>M<sub>low</sub></i> ( <i>SD</i> )	<i>M<sub>high</sub></i> ( <i>SD</i> )	<i>F</i>	$\eta_p^2$	<i>M<sub>low</sub></i> ( <i>SD</i> )	<i>M<sub>high</sub></i> ( <i>SD</i> )	<i>F</i>	$\eta_p^2$	<i>M<sub>low</sub></i> ( <i>SD</i> )	<i>M<sub>high</sub></i> ( <i>SD</i> )	<i>F</i>	$\eta_p^2$
Per. Severity	4.11 (1.25)	4.99 (1.14)	182.05***	.12	4.63 (1.32)	4.50 (1.22)	4.97*	.01	4.45 (1.31)	4.67 (1.22)	9.90**	.01
Per. Vulnerability	3.31 (1.19)	3.55 (1.22)	13.64***	.01	3.27 (1.21)	3.60 (1.19)	26.29***	.02	3.48 (1.25)	3.39 (1.16)	2.18	<i>ns</i>
Negative affect	3.16 (1.36)	3.52 (1.33)	23.08***	.02	3.20 (1.32)	3.49 (1.38)	14.55***	.01	3.31 (1.37)	3.38 (1.34)	.55	<i>ns</i>
Beh. Intentions	2.75 (1.57)	3.11 (1.73)	15.82***	.01	2.70 (1.63)	3.16 (1.66)	25.08***	.02	2.97 (1.71)	2.90 (1.62)	1.21	<i>ns</i>
Interaction Severity $\times$ Vulnerability												
	<i>M<sub>lowS,lowV</sub></i>	<i>M<sub>lowS,highV</sub></i>	<i>M<sub>highS,lowV</sub></i>	<i>M<sub>highS,highV</sub></i>	<i>F</i>		$\eta_p^2$					
Per. Severity	4.18 (1.30)	4.03 (1.19)	5.06 (1.19)	4.92 (1.09)	.01							
Per. Vulnerability	3.18 (1.18)	3.44 (1.18)	3.35 (1.23)	3.75 (1.19)	1.38							
Negative affect	3.10 (1.32) <sub>a</sub>	3.22 (1.39) <sub>a</sub>	3.30 (1.31) <sub>a</sub>	3.73 (1.32) <sub>b</sub>	4.76*							
Beh. Intentions	2.62 (1.57) <sub>a</sub>	2.88 (1.55) <sub>b</sub>	2.79 (1.69) <sub>a</sub>	3.42 (1.72) <sub>c</sub>	4.42*							

Notes. Multivariate statistic used was Pillai's trace.

\* $p < .05$ . \*\*\* $p < .001$ . *ns* denotes that effect sizes were not calculated for statistically insignificant results. Subscripted letters denote mean differences: for all groups with the same letter, the difference between the means is not statistically significant; if two groups have different letters, their means are significantly different.

<sup>3</sup>MANOVA was chosen because all dependent variables are conceptually related. Further, as they are moderately positively correlated (range:  $r = .284$  to  $.621$ ), MANOVA is an acceptable procedure following Tabachnick and Fidell (2007).



characteristics and emotion-evoking form on participants' response. No such combined effects between form and risk characteristics were observed. We only observed a combined effect of the two risk characteristics on behavioral intentions and negative affect.

### Mediating effects of perceived sensationalism

To test for potential mediating effects of perceived sensationalism on the effects of the different versions of the newspaper article on all four dependent variables, we conducted a row of analyses based on procedures recommended by Hayes (2013). Our hypothesized conceptual model as shown in Figure 2 posited that the effects of article form on the four audience response variables could be mediated by perceived sensationalism. In addition, we posited that the effect of form on perceived sensationalism may be contingent on portrayed severity and the vulnerability of the actual risk (as moderators). We thus tested a moderated mediation model with "form" as independent variable, risk severity and risk vulnerability as moderators and perceived sensationalism as mediator variable, running separate models for each of the four outcome variables. In the remainder, all regression coefficients are reported in unstandardized form. Independent variables and mediators were coded as follows: Low/factual conditions were coded as "0", high/emotional conditions as "1".

The moderated mediation hypothesis was tested employing the SPSS "PROCESS" macro (Model 11) developed by Hayes (2013). The procedure involved two steps. First, it tested for a moderated moderation of the effect of article form on perceived sensationalism by risk vulnerability and risk severity. This step was identical to performing a 3-way ANOVA<sup>4</sup> This analysis yielded significant effects of article form,  $b = .11$ ;  $p < .05$ , and of risk vulnerability,  $b = .10$ ;  $p < .05$ , on perceived sensationalism, however, not of risk severity. Further, the analysis yielded a significant 3-way interaction between form, vulnerability, and severity on perceived sensationalism ( $b = -.42$ ;  $p < .05$ ). No other interactions were significant. Estimating conditional effects

("simple effects") of the independent variable at each level of the moderators and their combinations using a pick-a-point approach (see Hayes & Matthes, 2009) indicated that form only affected perceived sensationalism, if severity information was high and vulnerability information was low ( $p < .01$ ), but not in any of the other constellations (all  $p > .12$ ). This showed that participants perceived the article to be more sensationalist, if it was presented in an emotion-laden compared to a factual form, but only, if the article reported on a virus which had severe health consequences, and contained information indicating that participants' vulnerability to the risk was low.

As the second step, the full moderated mediation model was tested with OLS regressions, and inspected the conditional indirect effects—that is, the strength of the indirect effects depending on the value combinations of the two moderators (low, high). Bootstrap confidence intervals (bias corrected) indicated an identical pattern of all observed indirect effects on the outcome variables. Specifically, results showed significant indirect and negative effects of form on all four dependent variables (*negative affect*, *perceived severity*, *perceived vulnerability*, *behavioral intentions*) through *perceived sensationalism*, but only when vulnerability was low and severity was high (all  $.07 < b < .09$ , all  $.02 < SE < .03$ , and all 95% CI  $[-.12 \text{ to } -.15, -.03 \text{ to } -.04]$ ), based on 5,000 bias-corrected bootstrap samples. In answer to RQ2, these results show that participants reading an article in emotion-laden form perceived it as more sensationalist than participants reading the factual article, but only, if vulnerability was low and severity high, that is, in the case of a serious disease, yet rather low chances to get infected. In answer to RQ3, results further demonstrate that perceived sensationalism counteracts the effects of news on participants' response under these conditions. More specifically, participants who perceived the article as more sensationalist, perceived their vulnerability and risk severity as smaller, felt less negative affect, and were less inclined to engage in risk-reducing behaviors.

Results additionally show that significant positive direct effects of form remained (if controlled for the reported indirect effects) on perceived severity ( $b = .25$ ,  $SE = .07$ , 95%

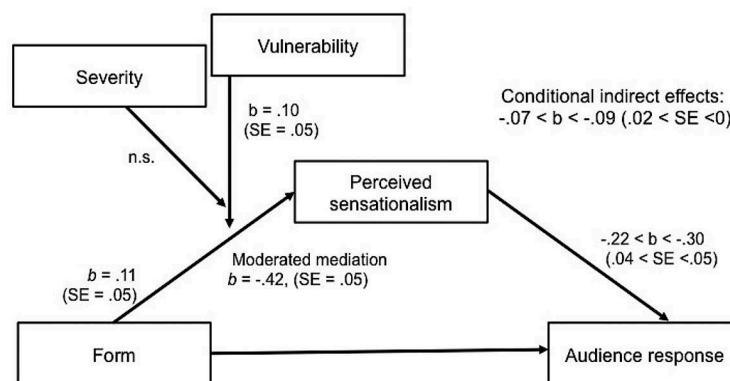


Figure 2. The conceptual moderated mediation model.

<sup>4</sup>Information on *Ms* and *SDs* of perceived sensationalism are available from the corresponding author.

$CI = [.11, .38]$ ). This indicates that the reported conditional effects of form on *perceived severity* are not entirely counteracted by a perception of the article as sensationalist.

## Discussion

The present study set out to examine what exactly drives heightened risk perceptions and fear: Emotion-laden reporting style, or real-world characteristics, that is, objective risks, themselves? Results revealed that responses were driven mostly by risk characteristics, not by an emotion-laden style. In fact, in the present study, the emotion-laden form of a news article only impacted how severe individuals perceived a risk, not whether they felt personally vulnerable, were afraid or worried. Our results are partially consistent with earlier studies, namely when demonstrating that emotion-evoking formal features of a news article increase perceptions of severity (Aust & Zillmann, 1996). Yet, they are partially conflicting, when finding no impact of emotional form on feelings of vulnerability and negative emotions (cf. Hong et al., 2010; Zillmann & Gan, 1996; Zillmann et al., 1999). Many of the observed effects are of small magnitude, yet even small effects can have a significant impact on public perceptions and health behaviors and in turn influence the spread or seriousness of an epidemic, especially for the topic of health news reporting.

The observed divergences from earlier findings have two implications. Firstly, that emotion-laden news only impacted how serious audiences perceive a health risk is important considering that emotion-laden news has been widely criticized for causing harmful responses. Indeed, irrational fears have at times caused skyrocketing demands for flu vaccination, inducing shortages and threatening the containment of crises (May, 2005) or have led to stigmatization and harsh treatment of victims, such as during the Ebola outbreak (Yusuf et al., 2015). In the present study, we find no evidence supporting the common assumptions that such fears and the resultant behaviors can be attributed to emotional coverage. Rather, we find that objective risk information matters most. Consequently, it seems if journalists overstate severity or vulnerability, in other words if they get the facts wrong, this may cause more harm than the choice for an emotional over a sober word, or a picture of a crying child over a picture of a politician.

Secondly, the observed divergence from earlier findings may be indicative of differences between the impact of news in real life compared to laboratory or classroom settings. For example, across two studies, Zillmann and colleagues (1999) did not observe robust effects of emotion-evoking photographs in news reports on participants' judgment of risk. Effects of emotional elements may be subtle and more likely to be uncovered in a setting where participants read a news story thoroughly, as given in an experimental setting. In our study, participants read the article in a more true-to-life (compared to laboratory) setting, in which surrounding distractions or interruptions may have attenuated the emotional effects of the news story. Yet in real-life settings readers are often exposed to distractions and disruptions, especially in an age of digital news consumption. Based on our findings, we

may speculate that effects are less intense if people do not read an article with highly focused attention as in laboratory settings. Consequently, the impact of emotion-laden news may be less disconcerting than previously assumed.

Responses to article quality were affected by risk characteristics (especially vulnerability) and emotion-evoking form alike. Results indicate that audiences may only judge an article that reports emotionally more sensational, if the story covers a highly severe risk to which their personal vulnerability is low. An example of this is an emotion-laden portrayal of a deadly disease spreading in a far-away country. From earlier research, we had derived two competing ways in which audiences may respond to emotion-laden health crisis news. Firstly, health communication studies would suggest that emotional health news triggers defensive processing (e.g., Van 't Riet & Ruiter, 2013), which leads individuals to devalue the quality of health messages under high-vulnerability conditions. Importantly, this paper adds theoretically to previous findings by showing that responses to emotion-laden news differ from such defensive processing of health risks that are aimed at protecting the self-concept. Our study finds that individuals devalue the quality of emotion-laden news not under high-vulnerability, but instead only under low-vulnerability conditions. Our findings thus support the alternative explanation derived from sensationalism research, that audiences discard news on health risks as sensational if these portray an objectively barely threatening risk in a disproportionately emotional manner. These findings fit with Grabe et al. (2003), who found a comparable pattern: If calm stories were portrayed in a sensationalist style these were perceived as less objective than if arousing stories were depicted the same way.

Interestingly, it appears that in the context of health risk coverage, audiences take their personal vulnerability to a sufficiently serious health risk as an anchor against which to judge the validity of the news reporting, not only the seriousness of this risk. To illustrate, following our findings Western audiences would be inclined to perceive emotional coverage on Ebola as sensational, as it pertains to a disease with serious health consequences that does, however, not affect them. This is regardless of the fact that the severity of the Ebola virus itself might more objectively be deemed worthy of emotion.

These findings are particularly interesting in the context of a content analysis of U.S. coverage of the 2014 Ebola outbreak. The study found that news was less sensationalist if an area was affected (e.g., had a confirmed case), than if it was unaffected (Ihekweazu, 2016). In other words, news sensationalism differed dependent on audiences' vulnerability: news was more sensational if audiences were less vulnerable. This suggests firstly that news media are less likely to sensationalize in a "hot crisis", and secondly, in the light of the present findings, implies that the scenario in which they tend to sensationalize is precisely the scenario in which audiences seem to recognize exaggeration and discard it.

Lastly, we aimed at reconciling the paradoxical finding from earlier research that emotion-evoking news increases risk perceptions and fear, yet may likewise instigate distrust in recipients. A mediation analysis showed that discrediting only occurs under specific conditions. Perhaps, the different

earlier studies in fact examined different combinations of reporting style and objective risk characteristics. Some may have examined emotion-laden reporting of an unlikely (sufficiently severe) risk, whereas other studies may have examined emotion-laden reporting of risks participants felt more vulnerable to. According to the present findings, emotion-laden reporting would only instigate distrust in the former case, not in the latter, which might explain conflicting findings.

This study investigated how the media portrayal of a risk influences how it is perceived, focusing on two key risk characteristics. As risk perceptions stem from a range of characteristics though (Slovic, 1987), it is worth considering how other characteristics of the Enterovirus may have impacted risk perceptions besides its severity and vulnerability. One of the most influential factors is the degree to which a risk evokes feelings of dread, which relates to perceiving a risk as potentially catastrophic and uncontrollable. The Enterovirus can be classified as rather uncontrollable (neither vaccination nor cure exists) and might evoke dread due to its epidemic proportions. Yet, it is less fatal and probably does not evoke the same dreadful images as other viruses, for example, Ebola. Accordingly, we would expect diseases higher in dread to evoke stronger emotional responses even if reported factually. Another important factor central in health communication frameworks is efficacy. It would be desirable for future studies to investigate additional factors in the context of epidemic news and sensationalism.

### Limitations and future studies

The current study carries several limitations. Firstly, despite successfully inducing significantly different levels of emotionality, the article in emotion-laden form was still perceived as moderately emotional only. This may have impacted the strength of effects.

Our choice for an imaginative scenario of a health crisis may have had repercussions on external validity, still we considered this choice necessary given ethical considerations. In an actual epidemic situation responses may be more intuitive, impulsive, and irrational, which we may not have been able to simulate in the present study.

The current study used single examples of media messages per condition. Scholars have discussed the limitations of such designs, as robust generalizations of findings require replication. While they found that single-message designs are still common practice in media psychological studies, they point out that studies using other designs, such as “replicated randomized trials in which message features are varied” are superior (O’Keefe, 2015, p. 106; Reeves, Yeykelis, & Cummings, 2016). To support the findings from this study, especially their generalizations, future replications are therefore desired.

Lastly, our manipulations did not include elements of layout that often characterize sensational reporting such as multiple photographs or typographical elements (e.g., large letters). Unfortunately, research on such elements is scarce, making it difficult to develop substantiated expectations of specific effects. It would be desirable that future studies examine alternative manipulations of emotion-laden coverage.

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The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the article.

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